

124,536

PATENT



SPECIFICATION

Application Date, Dec. 29, 1917. No. 19,233/17.

Complete Left, July 2, 1918.

Complete Accepted, Mar. 31, 1919.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Clinometers for use on Aircraft,  
Ships and the like.

We, LOUIS GODDEVRIENDT and ARTHUR GODDEVRIENDT, both of 93, Commercial Road, Swindon, Wiltshire, Mechanical Engineers, do hereby declare the nature of this invention to be as follows:—

This invention has reference to clinometers for use on aircraft, ships and the like, the objects of our invention being to provide a clinometer which when applied to an aeroplane will indicate to the pilot whether or not said aeroplane is flying laterally level or is inclined to port or starboard and the number of degrees of such inclination, said clinometer being so constructed and arranged as to make a permanent record on a moving roll of paper of the number of degrees of inclination on either side to which the aeroplane has been subjected during its flight.

Our said invention can also be used on board a steamer or sailing vessel or other craft navigating on or under the water to indicate whether such ship is level or inclined to port or starboard or fore and aft and the amount of such inclination:

According to our invention we provide in a suitable case an upstanding hand mounted on an axle (preferably fitted with ball bearings) and having a lower weighted continuation below the axle which causes the arm to always point upwardly at substantially an angle of 90° to the horizontal and in combination with this hand there is a dial of which the axle of the hand is the centre said dial being arranged and fixed in a vertical plane and graduated in degrees from the top "laterally level" zero point to the horizontal line. The case of the instrument is fixed in the body of the aeroplane square with the wings in front of the pilot so that when the wings are level the hand points to the top zero mark and the instrument will then by the position of the hand on the dial indicate the inclination of the aeroplane to port or starboard.

The lower part of the hand carries a recording pencil or pen which marks on a moving roll of paper a line indicating whether or not the aeroplane is flying level and if not the number of degrees to which it is inclined either to port or starboard. The roll of paper is worked from one spindle on to another at a required speed by means of any suitable clockwork.

Our said invention when in use on an aeroplane enables a pilot to determine if his machine is flying laterally level by day, by night and in foggy weather.

Supposing an aeroplane ascends at night, during foggy weather or gets lost in a cloud, in this case the weather conditions not allowing the pilot to observe the horizon, he is unable to ascertain for certain if his machine

[Price 6d.]

is flying laterally level or not. But if his machine is provided with our invention, fixed in the body of the aeroplane or airship square with the wings in front of the pilot in such a way that when the aeroplane or airship is laterally level the hand of the apparatus will then point to "laterally level", the pilot will be in a position to ascertain at any moment if the aeroplane is flying laterally level, the hand of the clinometer indicating instantaneously to the pilot any unusual inclination the aeroplane takes in its flight.

In the same time the recording pencil or pen will record on the moving roll of paper the number of degrees of inclination to which the aeroplane has been subjected during the journey, a point which seems to us of capital importance for investigation purposes in case of accident or dispute.

Also it would permit a director of a flying school to accurately determine after the landing, if an instructor with a pupil on board has punctually executed the orders.

As we said before our said clinometer being fixed in the body of the aeroplane square with the wings, takes the same inclinations as the aeroplane, while the hand revolving independently stops invariably in its vertical position point upwards by virtue of the weight at its lower end making thus always an angle of 90 degrees with the horizon, but pointing out to the pilot the number of degrees (up to 90 degrees) the wing is up or down either on port or starboard.

In this instrument there is always only one position of the hand with regard to the horizon, and that is the vertical position. The point of the hand and the degrees graduated on the dial of the instrument should be luminous, in order that the pilot should be able to follow the different movements of the aeroplane at night, and also in case the electric light should fail or should be switched off by the pilot if need be.

We suggest that the hand should be made in brass in order to neutralise any magnetic action.

Of course our said clinometer can be constructed according to size of any aeroplane or airship.

By fixing this instrument in longitudinal position in the body of an aeroplane or airship square with fore and aft and hand pointing to "laterally level", it would answer accurately and naturally the purposes of indicating the number of degrees the aeroplane or airship is inclined longitudinally.

Our said clinometer can be similarly constructed in bigger size and fixed on board of any steamer, sailing vessel or craft navigating under water or on the surface of the water, said clinometer working on the same principle,—that is that there is only one position of the hand of the instrument, the vertical position,—would answer the same purposes with regard to the stowage of goods in ships and would permit the officer in charge of the stowage, the captain and insurance officials, to determine the movements of the ship during and after the loading and unloading in port or in the roads, and during the journey of the ship from port to port.

Dated the 29th day of December, 1917.

LOUIS GODDEVRIENDT,  
ARTHUR GODDEVRIENDT,  
Mechanical Engineers.

#### COMPLETE SPECIFICATION.

Improvements in or relating to Clinometers for use on Aircraft,  
Ships and the like.

We, LOUIS GODDEVRIENDT and ARTHUR GODDEVRIENDT, both of  
52, Wheelays Road, in the City of Birmingham, formerly of

93, Commercial Road, Swindon, Wiltshire, Mechanical Engineers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 This invention has reference to clinometers for use on aircraft, ships and the like, the objects of our invention being to provide a clinometer which when applied to an aeroplane will indicate to the pilot whether or not said aeroplane is flying laterally level or is inclined to port or starboard and the number of degrees of such inclination, said clinometer being so constructed  
10 and arranged as to make a permanent record on a moving roll of paper of the number of degrees of inclination on either side to which the aeroplane has been subjected during its flight and also the duration of such inclination, this record being of importance for investigation purposes in cases of accident or dispute. Moreover our invention enables a director of a flying school to deter-  
15 mine accurately after the landing of an aeroplane whether or not the instructor with the pupil on board has effectually executed orders. Our said instrument can also be used on board a steamer, or a sailing ship or other craft navigating on the surface of the water or under the water and particularly when such ship is being loaded or unloaded as our invention will then indicate the phases  
20 of the inclination of the ship during such loading or unloading and will also show the inclination of the ship when at sea.

Moreover our invention can also be similarly used on aircraft or watercraft to indicate the inclination fore and aft.

In gradient indicators, and in speed, distance and gradient indicators, for  
25 use upon road vehicles it has previously been proposed to employ an indicating finger mounted on a dial and moved by the vibrations of a pendulum or the like so as to shew on the dial the inclination of the vehicle as it passes over various gradients; and it has also been proposed for the pendulum or the like to actuate a pencil on a moving chart so as to obtain a permanent record  
30 or the speed and distance travelled, and the inclination of the various gradients travelled over. Also it has been proposed to employ a pendulum actuated finger on a dial to indicate, by the inclination of the finger to the vertical, the relative elevation of the rails of a tramway or railway particularly at the curves of the track.

35 According to our invention we provide in a suitable case an upstanding hand mounted on an axle (preferably fitted with ball bearings) and having a lower weighted continuation below the axle which causes the arm to always point upwardly at substantially an angle of  $90^\circ$  to the horizontal and in combination with this hand there is a dial of which the axle of the hand is the centre,  
40 said dial being arranged and fixed in a vertical plane and graduated in degrees from the top "laterally level" zero point to the horizontal line. The case of the instrument is fixed in the body of the aeroplane square with the wings in front of the pilot so that when the wings are level the hand points to the top zero mark and the instrument will then by the position of the hand on the  
45 dial indicate the inclination of the aeroplane to port or starboard.

The lower part of the hand carries a recording pencil or pen which marks on a moving roll of paper a line indicating whether or not the aeroplane is flying level and if not the number of degrees to which it is inclined either to port or starboard. The roll of paper is worked from one spindle on to another at  
50 a required speed by means of any suitable clockwork.

Our invention is illustrated by the accompanying drawings of which

Fig. 1 is a front part sectional elevation of our invention constructed for use with aircraft;

Fig. 2 is a sectional side elevation of the same;

55 Fig. 3 is a front part sectional elevation of the lower part of a modified form of the said instrument, and

Fig. 4 is a sectional side elevation of the same.

"a is the upstanding hand which is mounted to rock on an axle b (preferably fitted with a ball bearing) the said hand being continued below the axle at c this lower part c being weighted so as to ensure the hand a always pointing upwardly. The axle b is fixed at the centre of the semicircular dial d which latter is fixed as by the backwardly turned end parts e to the sides of the box or case f of the instrument in which the weighted hand and the dial are enclosed, the said box or case being fitted with a front door g which has a glass front h through which the dial and upper part of the hand a can be clearly seen. On the vertical line of the dial there is a zero point 0 marked "laterally level" which is the point to which the hand points when the instrument is level, and at the sides of this zero point down to the horizontal line the dial is marked in degrees with the words "degrees out" "left wing up" on the left hand side of the instrument and the words "degrees out" "right wing up" on the right hand side of the same. In the particular instrument illustrated the words "right wing up" and "left wing up" are painted on the glass front h the other words together with the degrees and figures being marked on the dial. The lower weighted part c of the hand a is fitted with a backwardly projecting pencil or the like i which can conveniently be mounted to slide easily in a hole in a boss j of the lower part c of the hand a the said hole containing a coiled spring k and being fitted with an adjustably set screw l by which the pencil i can be adjusted to mark properly on the roll of paper m which is arranged between the pencil and hand and is mounted as a roll on a spindle n carried by suitable bearings in the casing and from this the paper is led off on to the second roll o which by means of any suitable clockwork apparatus indicated at "p" (of which many are well known) is caused to revolve so as to travel the paper round at a uniform speed from the spindle n to the spindle o. At the back of the roll of paper it is preferred to provide a fixed platform q to take the bearing of the pencil on the front of the paper.

The instrument above described is intended to be fixed in the body of the aeroplane square with the wings in front of the pilot so that the hand a will indicate on the dial whether or not the aeroplane is laterally level or inclined to port or to starboard, and the number of degrees of such inclination and at the same time the pencil i will record such level or inclined flight on the roll of paper m, thus forming a permanent record which as aforesaid might be of considerable importance for investigation purposes in case of an accident to the aeroplane or in case of a dispute.

It is preferred for the hand a and the degrees graduated on the dial a to be luminous so that the pilot will be able to follow the different movements of the aeroplane at night and also in case the electric light on the aeroplane fails or is switched off. The hand a together with the dial are preferably made of brass so as to neutralize any magnetic action.

It will be evident that the same instrument can if desired be fixed longitudinally of the body of the aeroplane or air ship square with fore and aft and with the hand pointing to "laterally level" zero when the aeroplane or air ship is substantially horizontal fore and aft and it will then indicate whether or not the aeroplane or air ship is level or to what angle upwardly or downwardly it is inclined.

As a modification of our invention instead of the roll of paper being arranged as in Figs. 1 and 2 to travel in a line at right angles to the horizontal said paper roll may if desired as indicated in Figs. 3 and 4 be arranged to travel horizontally and in this case the spindle n carrying the roll of unused paper and the spindle o on to which the paper is wound together with the necessary clock work will be arranged respectively in the right and left hand corners of the box or casing.

When our invention is used on board ship it serves as a ship's storage controller and it is preferred to use two of these instruments on the same ship one

being fixed to show whether or not the ship is laterally level and to indicate the amount of inclination to port or starboard, and the other instrument being fixed longitudinally of the ship to show the inclination fore or aft.

5 The instrument on board ship is useful when the ship is being loaded as it enables the officer in charge of the stowage or the captain and insurance officers to determine the phases of the ship during and after the loading and unloading in the ports or in roads and indicates the amount to which the ship is inclined during its journey.

10 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In a clinometer for use on aircraft, ships and the like, the combination of a dial adapted to be fixed in a vertical plane and marked in degrees on each side of its central vertical line, an upstanding hand mounted on a central axle  
15 of said dial and adapted to indicate thereon and weighted below said axle so as thereby to be maintained upright, a rolled length of paper at the back of said hand, two rolls for carrying the same, clockwork mechanism for rolling said paper from one roll on to the other, and a pencil or the like carried by said hand and adapted to mark on said paper roll variations of the hand  
20 relatively to the dial, substantially as set forth.

2. A clinometer according to Claim 1 for use on aircraft, ships and the like constructed substantially in either of the ways hereinbefore described and illustrated by the accompanying drawings.

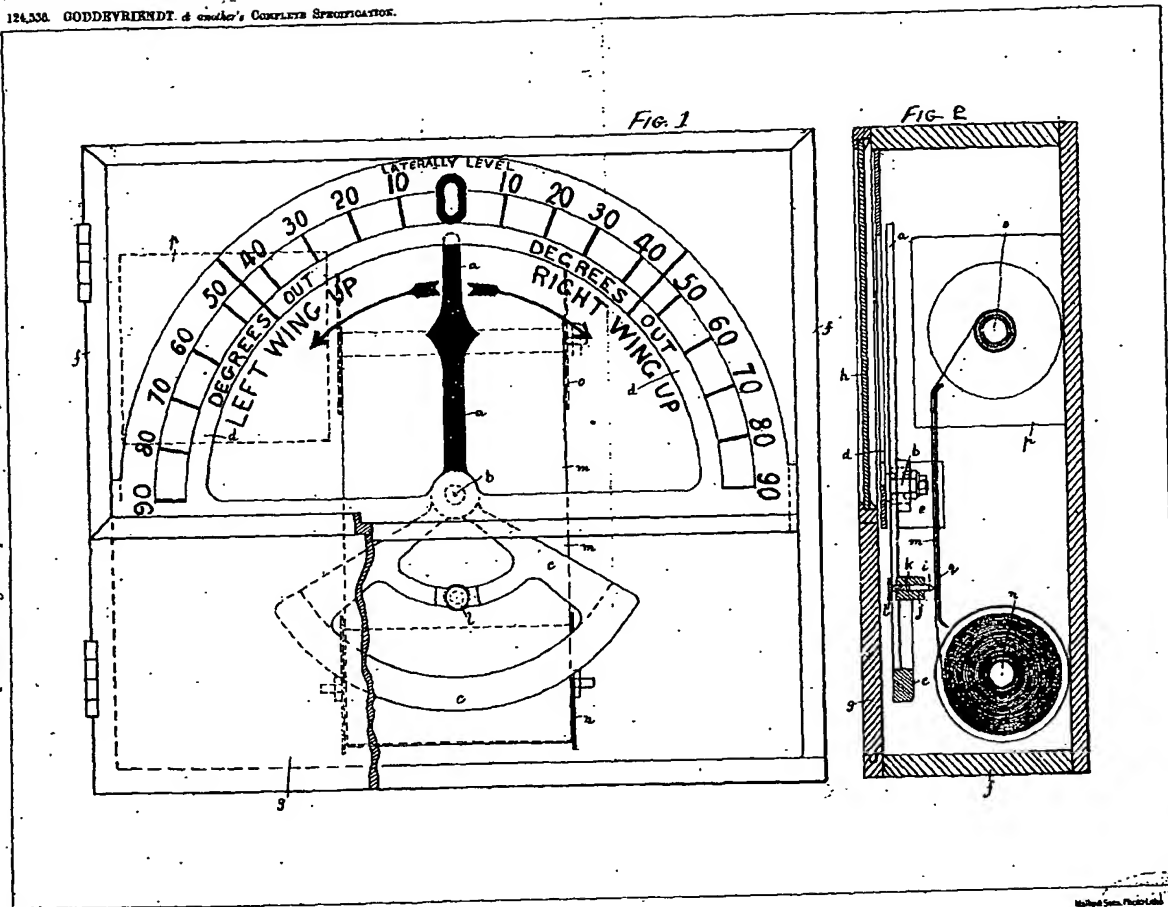
Dated this 27th day of June, 1918.

25

CHAS. B. KETLEY,  
Agent for the Applicants.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1919.

[This Drawing is a reproduction of the Original on a reduced scale.]



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[This Drawing is a reproduction of the Original on a reduced scale.]

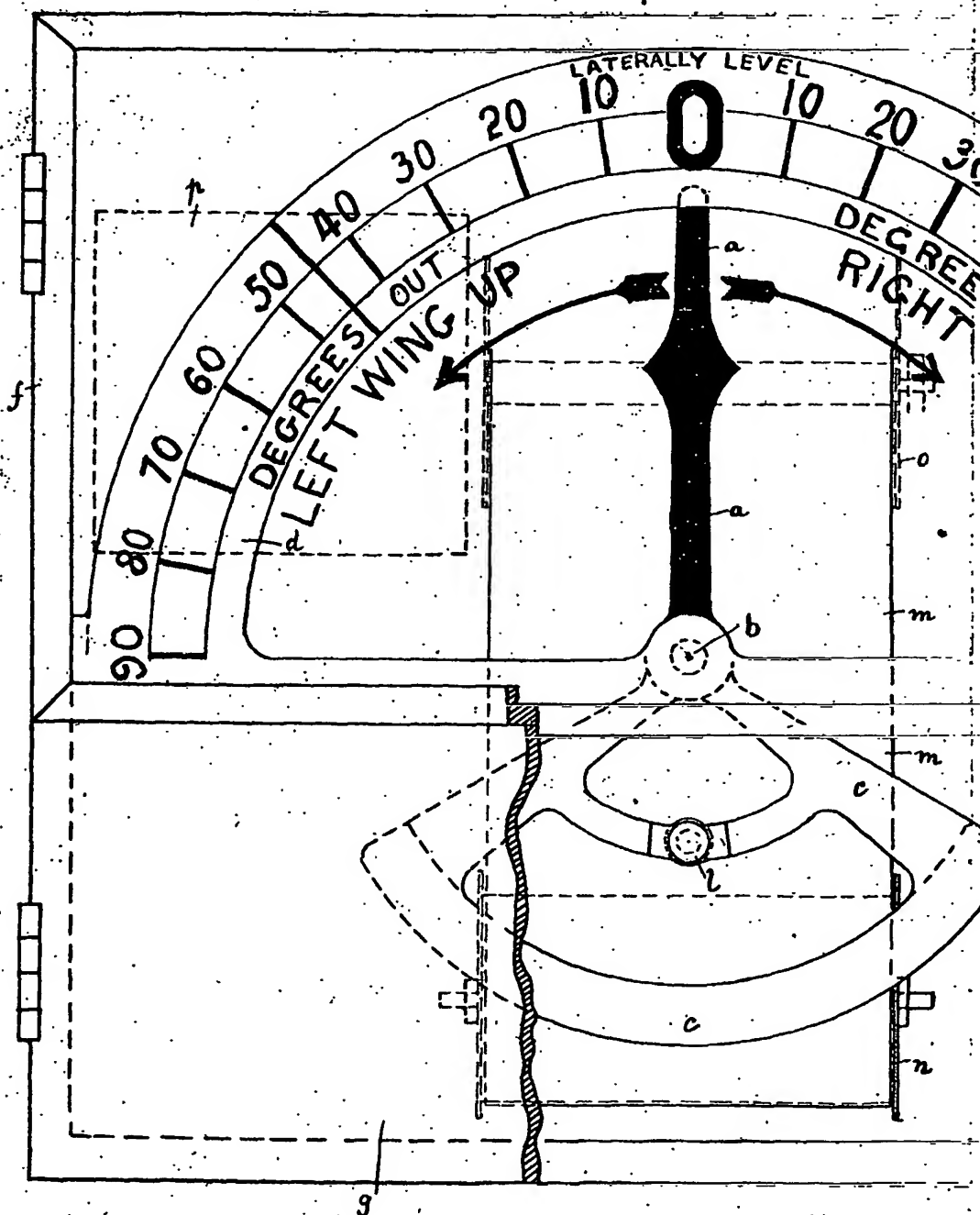


FIG. 1

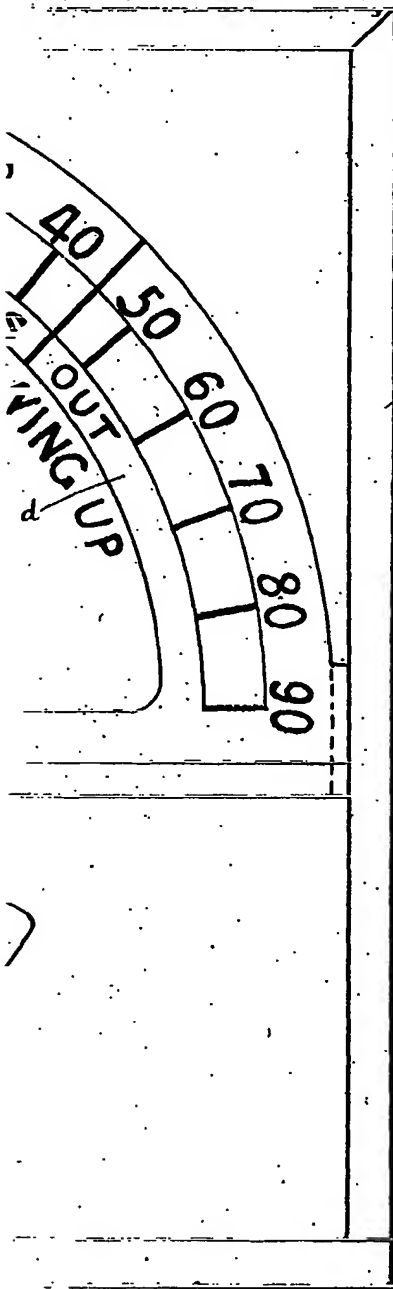
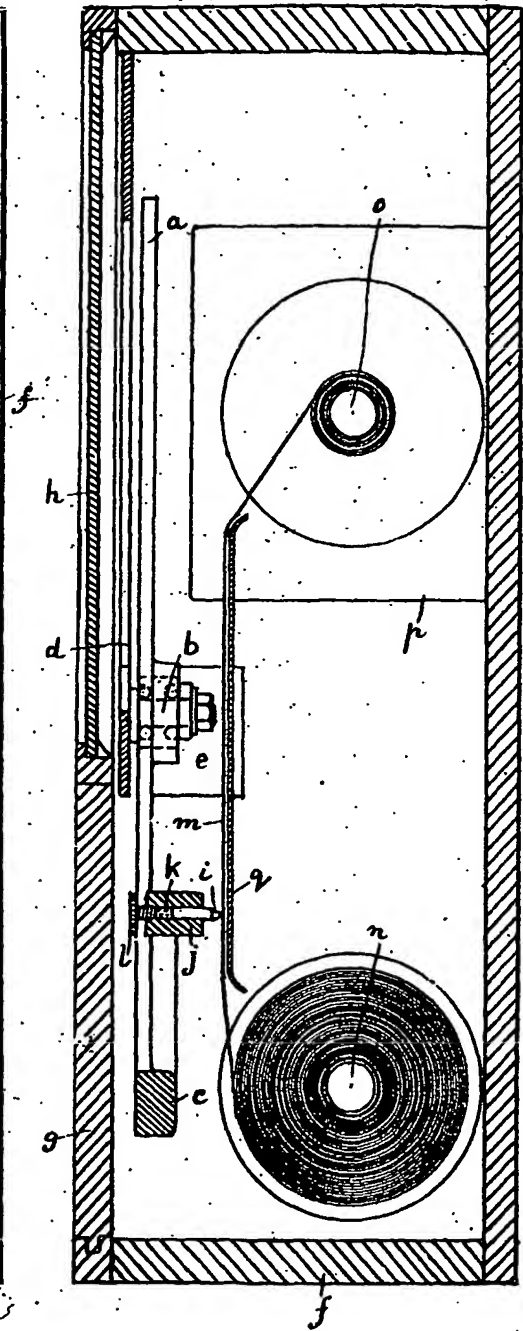
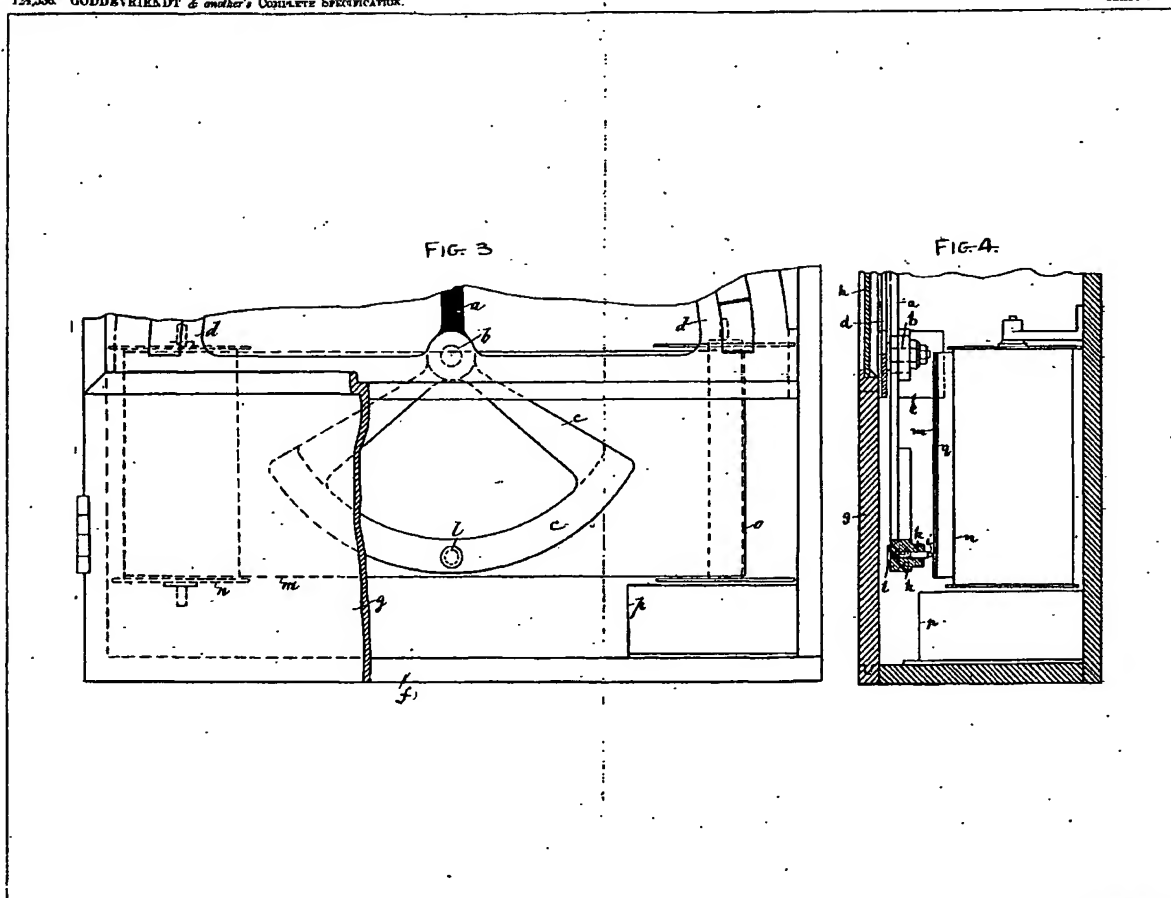


FIG. 2





[This Drawing is a reproduction of the Original on a reduced scale.]



Valley View, Photo-Litho

*[This Drawing is a reproduction of the Original on a reduced scale.]*

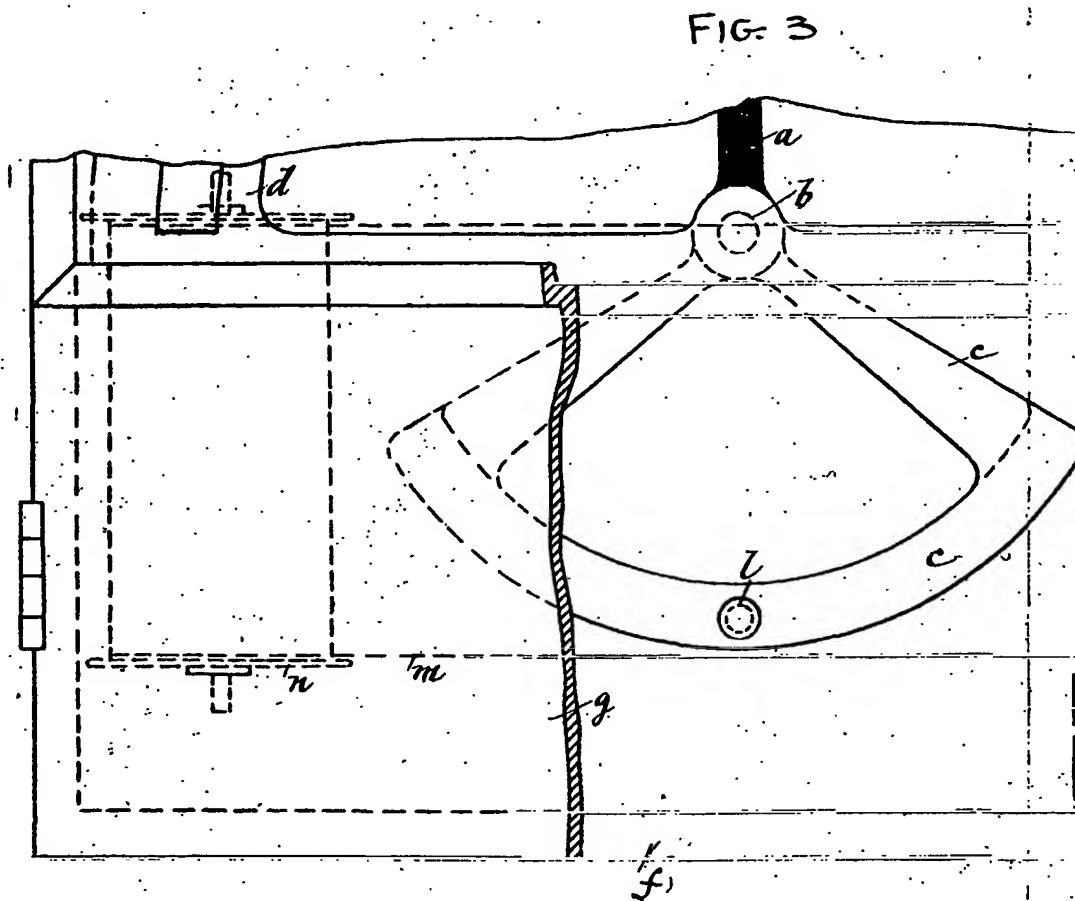
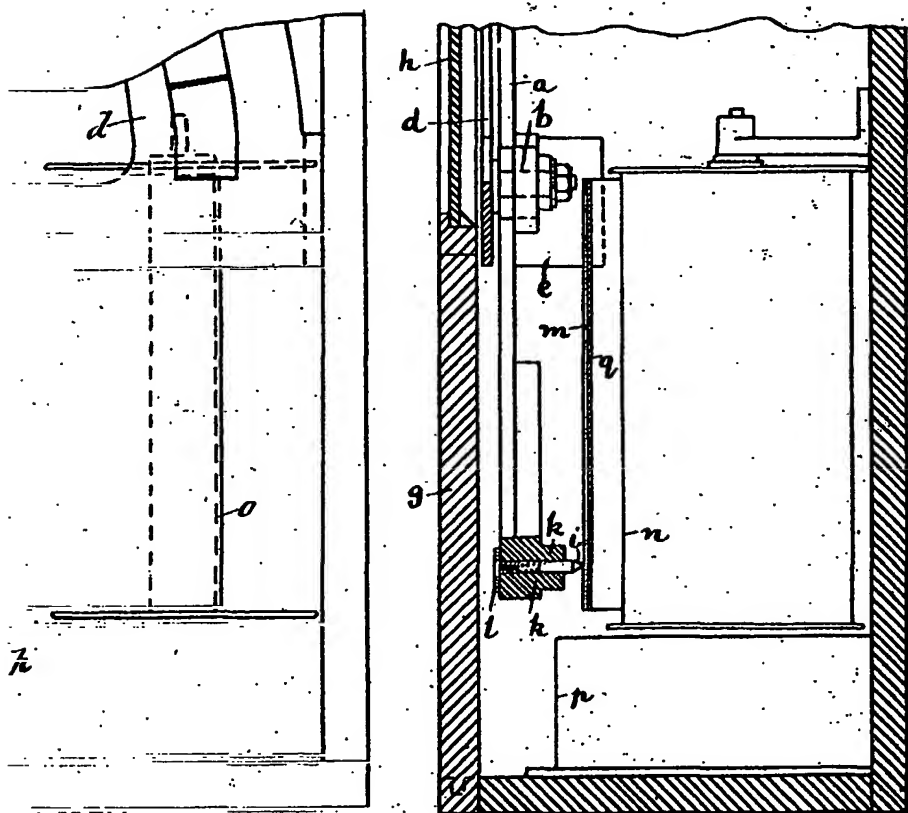


FIG. 4.



Malby & Sons, Photo-Litho